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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/939,932	RUSSELL, GARY	
	Examiner	Art Unit	
	James A. Thompson	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,17-27,30,33-37,39-48,50-57 and 59-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,17-27,30,33-37,39-48,50-57 and 59-75* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, filed 22 June 2007, with respect to the prior art rejections have been fully considered and are persuasive. The prior art rejections set forth in the previous office action mailed 23 January 2007 have been withdrawn. Shinya (USPN 4,677,493) is directed to printing using dots, and could thus reasonably be considered to be applicable to a halftoning environment, such as the halftoning environment shown in Curry (USPN 5,696,604). However, Shinya does not expressly disclose that a halftone environment is used. Further, Shinya is also applicable to dot matrix printing, and is thus not necessarily a halftone printing system. Thus, in view of Applicant's present arguments, the finality of said previous office action is withdrawn and the prosecution of the merits is reopened.

The presently recited claims are, however, all demonstrated below to be obvious to one of ordinary skill in the art at the time of the invention. New prior art rejections based on the claims as amended in Applicant's arguments filed 22 June 2007, which are now entered, are set forth in detail below.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 48 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 48 recites the limitation "said program" in line 4. There is insufficient antecedent basis for this limitation in the claim.

4. Claims 68-70 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 68 recites the limitation "said program" in line 6. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 46 is rejected under 35 U.S.C. 102(b) as being anticipated by Wang (US Patent 5,748,330).

Regarding claim 46: Wang discloses a scanning circuit for reading image data from a source (column 6, lines 8-20 of Wang); a processor in communication with said scanning circuit, wherein said processor receives and processes the image data to generate an image file (column 6, lines 6-20 of Wang); and an image setter in communication with said processor, wherein said image setter receives said image file from said processor and produces a plurality of dots on a halftone screen (figure 3A and column 6, lines 6-20 of Wang), said plurality of dots including a first and second dot within a halftone cell of said halftone screen, wherein said image setter determines that at least a portion of said first dot overlaps at least a portion of said second dot (figures 3A-3D; column 6, lines 6-9 and lines 21-24; column 3, lines 51-53; and column 4, lines 3-7 of Wang).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-3, 5, 27, 30, 42 and 65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604).

Regarding claim 1: Shinya discloses a method comprising determining an overlap of at least a portion of a first dot (figure 3(r(l)) of Shinya) of a cell of a screen with at least a portion of a second dot (figure 3(r(s)) of Shinya) of said cell of said screen (figures 3-4 and column 3, line 56 to column 4, line 14

of Shinya); and overlapping said at least said portion of said first dot with said at least said portion of said second dot (figure 5B and column 4, lines 25-34 of Shinya).

Shinya does not disclose expressly printing using halftone processing, and thus said cell is a halftone cell and said screen is a halftone screen.

Curry discloses printing using halftone processing with a halftone cell and a halftone screen (column 4, lines 26-29 and column 5, lines 10-19 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. The suggestion for combining the references would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit the general operation of Shinya to the very specific application of halftoning taught by Curry. Therefore, it would have been obvious to combine Curry with Shinya to obtain the invention as specified in claim 1.

Regarding claim 2: Shinya discloses differing line frequencies of said first and second dots (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Regarding claim 3: Shinya does not disclose expressly differing shapes of said first and second dots.

Curry discloses differing dot shapes (column 5, lines 12-17 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes, as taught by Curry, for the first and second dots taught by Shinya. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya to obtain the invention as specified in claim 3.

Regarding claim 5: Shinya discloses differing tonal characteristics of said first and second dots (figure 5B and column 4, lines 30-34 of Shinya). The smaller dot that is overlapped with the larger dot is set such that the connection of the dots is smoothed (figure 5B and column 4, lines 30-34 of Shinya). The

difference in size, along with the smoothing function, thus creates differing tonal characteristics since the smaller dot will be more affected by the smoothing process, which can easily be determined from figure 5B of Shinya.

Regarding claim 27: Shinya discloses a processor (column 8, lines 35-38 of Shinya) configured to place a first dot (figure 3(r(l)) of Shinya) and a second dot (figure 3(r(s)) of Shinya) within a cell of a screen, to determine an overlap between at least a portion of said first dot and at least a portion of said second dot (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya), to overlap said at least said portions (figure 5B and column 4, lines 25-34 of Shinya); and a computer-readable medium bearing said program (column 8, lines 35-38 of Shinya).

Shinya does not disclose expressly printing using halftone processing, and thus said cell is a halftone cell and said screen is a halftone screen.

Curry discloses printing using halftone processing with a halftone cell and a halftone screen (column 4, lines 26-29 and column 5, lines 10-19 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. The suggestion for doing so would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit the general operation of Shinya to the very specific application of halftoning taught by Curry. Therefore, it would have been obvious to combine Curry with Shinya to obtain the invention as specified in claim 27.

Regarding claim 30: Shinya discloses a processor (column 8, lines 35-38 of Shinya) configured to place a first dot (figure 3(r(l)) of Shinya) and a second dot (figure 3(r(s)) of Shinya) within a cell of a screen (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya); and a computer-readable medium bearing said program (column 8, lines 35-38 of Shinya).

Shinya does not disclose expressly printing using halftone processing, and thus said cell is a halftone cell and said screen is a halftone screen; that said first dot and said second dot are generated at a threshold value; and that said first and second dots can further be dissimilar in frequency and shape; and that said dissimilar characteristic is specifically selected.

Curry discloses printing using halftone processing with a halftone cell and a halftone screen (column 4, lines 26-29 and column 5, lines 10-19 of Curry); generating dots at a threshold value (column 3, lines 60-67 of Curry – response of printer to input intensity to produce a hardcopy dot well-known to be based on threshold values); and specifically selecting dot characteristics including dot frequency (figures 5a-5d and column 4, lines 25-29 of Curry) and dot shape (column 5, lines 12-17 of Curry). The dot area corresponds to dot frequency since, for a particular area and shape, a certain frequency is generated for the halftone dot screen.

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. The suggestion for doing so would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit the general operation of Shinya to the very specific application of halftoning taught by Curry. Furthermore, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to include dot frequency and dot shape selection, as taught by Curry, as one of the dissimilarities in the group of possible dissimilarities between said first and second dots. Dot properties of said first and second dots, and thus the dissimilarities of said first and second dots, taught by Shinya would be specifically selected, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Additionally, it would have been obvious to one of ordinary skill in the art at the time of the invention to generate both the first and second dot using a threshold level, as taught by Curry. Since the first dot and second dot taught by Shinya are printed so as to smooth the connection of dots (figure 5B and column 4, lines 30-34 of Shinya), said first dot and said second dot would thus be generated based on the same threshold value. Therefore, it would have been obvious to combine Curry with Shinya to obtain the invention as specified in claim 30.

Regarding claim 42: Shinya discloses creating said image (halftone image *as per* the combination of Shinya in view of Curry) to include dots (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya) having different line frequencies (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Regarding claim 65: Shinya discloses that producing said image (halftone image *as per* the combination of Shinya in view of Curry) further includes producing at least one of a printing plate, a threshold array, and a halftone screen (figures 1A-1C; figure 9; and column 8, lines 5-10 of Shinya).

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604) and Broddin (US Patent 5,982,989).

Regarding claim 4: Shinya does not disclose expressly selecting said shapes of said first and second dots from a group consisting of: elliptical, triangular, circular, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry does not disclose expressly that said group also contains elliptical and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Shinya in view of Curry is combinable with Broddin because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Shinya in view of Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Shinya in view of Curry to obtain the invention as specified in claim 4.

10. Claims 7, 14-15, 19-22, 24-25, 33-37, 39-41, 44, 50, 52, 54-55, 67 and 73-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604) and Delabastita (US Patent 5,828,463).

Regarding claim 7: Shinya in view of Curry does not disclose expressly orienting a first angle of said first dot differently than a second angle of said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first angle of a first dot differently than a second angle of a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15–20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Shinya at different angles, as taught by Delabastita. The motivation for doing so would have been to mitigate the additional problem of "micro moiré" (column 1, lines 46-54 of Delabastita). Therefore, it would have been obvious to combine Delabastita with Shinya in view of Curry to obtain the invention as specified in claim 7.

Regarding claim 14: Shinya discloses a first dot (figure 3(r(l)) of Shinya) and a second dot (figure 3(r(s)) of Shinya) within a cell of a screen (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya), wherein at least a portion of said first dot is programmatically determined to overlap at least a portion of said second dot (figure 5B and column 4, lines 25-34 of Shinya).

Shinya does not disclose expressly printing using halftone processing, and thus said cell is a halftone cell and said screen is a halftone screen; and that said halftone screen is specifically formed by a manufactured printing plate comprising a printing and a non-printing surface.

Curry discloses printing using halftone processing with a halftone cell and a halftone screen (column 4, lines 26-29 and column 5, lines 10-19 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit

the general operation of Shinya to the very specific application of halftoning taught by Curry. The suggestion for doing so would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry does not disclose expressly that said halftone screen is specifically formed by a manufactured printing plate comprising a printing and a non-printing surface.

Delabastita discloses a printing plate manufactured to form a halftone screen for printing a halftone image (column 6, lines 49-57 of Delabastita) comprising a printing and a non-printing surface (column 14, lines 66-67 of Delabastita).

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Shinya in view of Curry on a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Shinya in view of Curry to obtain the invention as specified in claim 14.

Regarding claim 19: Shinya in view of Curry does not disclose expressly that said first dot is oriented at a different angle than said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first dot at a different angle than a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15–20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Shinya at different angles, as taught by Delabastita. The motivation for doing so would have been to mitigate the additional problem of "micro moiré" (column 1, lines 46-54 of Delabastita). Therefore, it would have been obvious to combine Delabastita with Shinya in view of Curry to obtain the invention as specified in claim 19.

Regarding claim 20: Shinya discloses a first dot (figure 3(r(l)) of Shinya) and a second dot (figure 3(r(s)) of Shinya) within a cell of a screen (figures 3-4 and column 3, line 56 to column 4, line 14

of Shinya), wherein at least a portion of said first dot overlaps at least a portion of said second dot (figure 5B and column 4, lines 25-34 of Shinya).

Shinya does not disclose expressly printing using halftone processing, and thus said cell is a halftone cell and said screen is a halftone screen; that said halftone screen is specifically formed by a manufactured printing plate; and that said first and second dots are dissimilar.

Curry discloses printing using halftone processing with a halftone cell and a halftone screen (column 4, lines 26-29 and column 5, lines 10-19 of Curry); and dissimilar dot shapes for halftone dots (column 5, lines 12-17 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. The suggestion for doing so would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit the general operation of Shinya to the very specific application of halftoning taught by Curry. Further, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus dissimilar dot shapes, as taught by Curry, for the first and second dots taught by Shinya. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry does not disclose expressly that said halftone screen is specifically formed by a manufactured printing plate.

Delabastita discloses using a printing plate manufactured to form a halftone screen for printing a halftone image (column 6, lines 49-57 of Delabastita).

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Shinya in view of Curry on a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in

the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Shinya in view of Curry to obtain the invention as specified in claim 20.

Regarding claim 21: Shinya discloses that each of said first and second dots has a different line frequency (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have different line frequencies.

Regarding claims 15 and 22: Shinya does not disclose expressly that each of said first and second dots has a different shape.

Curry discloses different dot shapes for halftone dots (column 5, lines 12-17 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes, as taught by Curry, for the first and second dots taught by Shinya. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya to obtain the invention as specified in claims 15 and 22.

Regarding claim 24: Shinya discloses that each of said first and second dots has a different tonal characteristic (figure 5B and column 4, lines 30-34 of Shinya). The smaller dot that is overlapped with the larger dot is set such that the connection of the dots is smoothed (figure 5B and column 4, lines 30-34 of Shinya). The difference in size, along with the smoothing function, thus creates differing tonal characteristics since the smaller dot will be more affected by the smoothing process, which can easily be determined from figure 5B of Shinya.

Regarding claim 25: Shinya in view of Curry does not disclose expressly orienting a first angle of said first dot differently than a second angle of said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first angle of a first dot differently than a second angle of a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15–20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Shinya at different angles, as taught by Delabastita. The motivation for doing so would have been to mitigate the

additional problem of "micro moiré" (column 1, lines 46-54 of Delabastita). Therefore, it would have been obvious to combine Delabastita with Shinya to obtain the invention as specified in claim 25.

Regarding claim 33: Shinya discloses a method comprising creating a screen including dots (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya) having different line frequencies (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Shinya does not disclose expressly printing using halftone processing, and thus said dots are halftone dots and said screen is a halftone screen; and that said halftone screen in on a manufactured printing plate; and that said halftone dots are generated at a threshold value.

Curry discloses printing using halftone processing with a halftone cell and halftone dots (column 4, lines 26-29 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. The suggestion for doing so would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit the general operation of Shinya to the very specific application of halftoning taught by Curry. Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry does not disclose expressly that said halftone screen in on a manufactured printing plate; and that said halftone dots are generated at a threshold value.

Delabastita discloses using a printing plate manufactured to form a halftone screen for printing a halftone image (column 6, lines 49-57 of Delabastita); and that said halftone dots are generated at a threshold value (column 9, lines 26-32 of Delabastita).

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Shinya in view of Curry on a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in

the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Shinya in view of Curry to obtain the invention as specified in claim 33.

Regarding claim 34: Shinya discloses integrating fine and coarse frequency dots (as can be seen in figure 5B of Shinya).

Regarding claim 35: Shinya discloses overlapping at least a portion of a first dot (figure 3(r(l)) of Shinya) of a halftone cell of said printing plate (taught by Delabastita) with a at least a portion of a second dot (figure 3(r(s)) of Shinya) of said halftone cell (figure 5B and column 4, lines 25-34 of Shinya).

Regarding claim 36: Shinya discloses placing a first dot (figure 3(r(l)) of Shinya) and a second dot (figure 3(r(s)) of Shinya) within a cell (halftone cell *as per* the combination of Shinya in view of Curry) (figures 1A-1C and column 2, line 63 to column 2, line 3 of Shinya) of said printing plate (taught by Delabastita), wherein said first and said second dots (halftone dots *as per* the combination of Shinya in view of Curry) are dissimilar (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the two dots are of different sizes, and are therefore dissimilar.

Regarding claim 37: Shinya discloses creating at least one of a screen (halftone screen *as per* the combination of Shinya in view of Curry) (figures 1A-1C and column 2, line 63 to column 2, line 3 of Shinya) and a threshold array, both said array and said screen including dots having different screen frequencies (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have different frequencies.

Regarding claim 50: Shinya discloses that said integrating said fine and coarse frequency dots further includes generating a mid-tone dot (figure 1B; figure 5B; and column 4, lines 20-34 of Shinya). A mid-tone dot (figure 1B of Shinya) is generated using fine and coarse frequency (small and large) dots (figure 5B and column 4, lines 20-34 of Shinya).

Regarding claim 52: Shinya discloses generating at least one of said dots to include a frequency selected from a group consisting of at least one of: a fine pitch (figure 5B(r(s)) of Shinya), a coarse pitch (figure 5B(r(l)) of Shinya), and an integrated pitch.

Regarding claim 54: Shinya discloses creating a smooth transition between said dots (column 4, lines 30-34 of Shinya).

Regarding claim 67: Shinya discloses dots generated using a screen (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya), wherein said dots include different line frequencies (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Shinya does not disclose expressly printing using halftone processing, and thus said dots are halftone dots and said screen is a common halftone screen; that said dots are included on a printing plate comprising a printing and a non-printing surface; and that said halftone dots are generated at a threshold value.

Curry discloses printing using halftone processing with a common halftone screen and halftone dots (column 4, lines 26-29 and column 5, lines 10-19 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing using different sized dots. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply Shinya specifically to halftoning. The suggestion for doing so would have been that both Shinya and Curry print based on forming dots of different sizes, and halftoning is a common form of gray level printing. In both Shinya and Curry, a pattern of dots with varying, adjusted sizes are printed (see figure 3; figure 8; and column 7, lines 16-28 of Shinya; and figures 5a-5d and column 5, lines 24-42 of Curry). While Shinya is used generally for printing *via* dots of different sizes, the combination of Shinya in view of Curry would limit the general operation of Shinya to the very specific application of halftoning taught by Curry. Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry does not disclose expressly that said dots are included on a printing plate comprising a printing and a non-printing surface; and that said halftone dots are generated at a threshold value.

Delabastita discloses a printing plate comprising a printing and a non-printing surface (column 14, lines 66-67 of Delabastita), wherein said printing surface is manufactured using a common halftone screen (column 6, lines 49-57 of Delabastita) that includes halftone dots generated at a threshold value (figure 10b and column 9, lines 19-25 of Delabastita – levels shown are clearly threshold levels).

Shinya in view of Curry is combinable with Delabastita because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to embody the halftone screen taught by Shinya in view of Curry on a printing plate and halftone using thresholds, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen and thresholding is the common method of performing image halftoning. Therefore, it would have been obvious to combine Delabastita with Shinya in view of Curry to obtain the invention as specified in claim 67.

Regarding claim 39: Shinya discloses generating at least one of said dots to include a frequency selected from a group consisting of at least one of: a fine pitch (figure 5B(r(s)) of Shinya), a coarse pitch (figure 5B(r(l)) of Shinya), and an integrated pitch.

Regarding claim 40: Shinya discloses that said halftone screen (taught by Curry) includes at least a portion of a first dot overlapped with at least a portion of a second dot (as can clearly be seen in figure 5B of Shinya).

Regarding claim 41: Shinya discloses that said halftone screen (taught by Curry) includes first (figure 3(r(l)) of Shinya) and second (figure 3(r(s)) of Shinya) dots, wherein said first and said second dots (halftone dots *as per* the combination of Shinya in view of Curry) are dissimilar (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the two dots are of different sizes, and are therefore dissimilar.

Regarding claim 44: Shinya discloses that said halftone screen (taught by Curry) further comprises dots having different line frequencies (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have different frequencies.

Regarding claim 55: Shinya discloses that said halftone screen (taught by Curry) further includes a gradual transition between said dots having different line frequencies (figure 5B and column 4, lines 30-34 of Shinya).

Regarding claim 73: Shinya discloses at least one of a screen (halftone screen *as per* the combination of Shinya in view of Curry) (figures 1A-1C and column 2, line 63 to column 2, line 3 of Shinya) and a threshold array, wherein both said array and said screen are associated with image print production (column 4, lines 25-34 of Shinya). By combination with Delabastita, as set forth in the arguments regarding claims 14 and 67, said array would be associated with said printing plate since said printing plate is used for halftone printing production.

Regarding claim 74: Shinya discloses at least one of a halftone screen (figures 1A-1C and column 2, line 63 to column 2, line 3 of Shinya) and a threshold array, wherein both said array and said screen are associated with halftone production (column 4, lines 25-34 of Shinya). By combination with Delabastita, as set forth in the arguments regarding claim 20, said array would be associated with said printing plate since said printing plate is used for halftone production.

11. Claims 8-9, 12, 43, 60, 62, 64, 68-69 and 75 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Tai (US Patent 5,729,632).

Regarding claim 8: Shinya discloses placing a first dot of a screen and a second dot of said screen within a cell (figures 1A-1C and column 4, lines 17-24 of Shinya).

Shinya does not disclose expressly printing using halftone processing, and thus said cell is a halftone cell and said screen is a halftone screen; that said dots are generated at a threshold value; and that said first and second halftone dot shapes are dissimilar.

Tai discloses printing using halftone processing, and thus a halftone cell and a halftone screen (column 8, lines 27-33 of Tai); generating dots at a threshold value (column 7, lines 29-35 of Tai); and using dissimilar halftone dot shapes (figure 2 and column 3, lines 37-43 of Tai).

Shinya and Tai are combinable because they are from the same field of endeavor, namely digital digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to perform halftoning using dissimilar dot shapes, which are generated at threshold values, as taught by Tai, which would include said first and second halftone dot shapes taught by Shinya. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Shinya to obtain the invention as specified in claim 8.

Regarding claim 9: Shinya discloses differing line frequencies of said first and second dots (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Regarding claim 12: Shinya discloses differing tonal characteristics of said first and second dots (figure 5B and column 4, lines 30-34 of Shinya). The smaller dot that is overlapped with the larger dot is set such that the connection of the dots is smoothed (figure 5B and column 4, lines 30-34 of Shinya). The difference in size, along with the smoothing function, thus creates differing tonal characteristics since the smaller dot will be more affected by the smoothing process, which can easily be determined from figure 5B of Shinya.

Regarding claim 43: Shinya discloses creating an array that includes dots (figures 3-4 and column 3, line 56 to column 4, line 14 of Shinya) having different line frequencies (figure 3(r(l),r(s)) of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Regarding claims 60 and 68: Shinya discloses a method for producing an image using a program that executes on a processor (column 8, lines 35-38 of Shinya), comprising creating an array including a gradual transition of said array (column 4, lines 30-34 of Shinya), and wherein said gradual transition includes multiple dots having multiple line frequencies (figure 5B and figure 3(r(l), r(s)) of Shinya); and a computer-readable medium bearing said array (column 8, lines 35-38 of Shinya). As can be seen in figure 3 of Shinya, the sizes of the two dots show that the two dots have differing line frequencies.

Shinya does not disclose expressly that said image is a halftone image and said dots are halftone dots; that said array is a threshold array; that said gradual transition is between highlights and shadows; and that said multiple halftone dots are at a threshold value.

Tai discloses printing using halftone processing, and thus a halftone screen and halftone dots (column 8, lines 27-33 of Tai); a threshold array (figure 10A and column 9, lines 26-29 of Tai); multiple halftone dots at a threshold value (column 8, lines 24-34 and lines 40-46 of Tai); and a gradual transition (column 9, lines 16-25 of Tai) between highlights and shadows (column 4, lines 30-40 of Tai). A gradually transitioning dot growth pattern is used in the apparatus of Tai (column 9, lines 16-25 of Tai), which produces a gradual transition between the highlights and shadows (column 4, lines 30-40 of Tai).

Shinya and Tai are combinable because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to produce a gradual transition between highlights and shadows and generating multiple halftone dots at a threshold value using a threshold array, as taught by Tai. The suggestion/ motivation for doing so would have been that threshold arrays are commonly used in halftoning to determine where a dot should be printed for a particular input gray level; and producing a gradual transition between different image regions will better reproduce images with different regions (column 2, lines 46-51 of Tai) and reduce the overall level of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Shinya to obtain the invention as specified in claims 60 and 68.

Regarding claim 62: Shinya discloses programmatically determining to overlap dots of said array (figure 5B and column 4, lines 25-34 of Shinya) (threshold array *as per* the teachings of Tai).

Further regarding claim 64: Tai discloses using said threshold array to generate a halftone image (column 8, lines 40-46 of Tai).

Regarding claim 69: Shinya discloses that said threshold array (taught by Tai, used to generate dots for hardcopy output) further includes overlapped dots (figure 5B and column 4, lines 25-34 of Shinya).

Regarding claim 75: Shinya discloses a program product, comprising: a program (column 8, lines 35-38 of Shinya) configured to produce an array (figures 1A-1C of Shinya), wherein said array includes a smooth transition (column 4, lines 30-34 of Shinya), and wherein said smooth transition comprises multiple dots having multiple line frequencies (figure 3(r(l),r(s)) of Shinya); and a computer-readable medium bearing said program (column 8, lines 35-38 of Shinya). As can be seen in figure 3 of Shinya, the sizes of the multiple dots show that the multiple dots have multiple line frequencies.

Shinya does not disclose expressly printing using halftone processing, and thus said dots are halftone dots; said array is a threshold array that includes a highlight and a shadow region; and that said multiple halftone dots are at a threshold value.

Tai discloses printing using halftone processing, and thus halftone dots (column 8, lines 27-33 of Tai); a threshold array (figure 10A and column 9, lines 26-29 of Tai) that includes a highlight and a shadow region (column 4, lines 30-40 and column 9, lines 16-25 of Tai); and multiple halftone dots at a threshold value (column 8, lines 24-34 and lines 40-46 of Tai). A gradually transitioning dot growth pattern is used in the apparatus of Tai (column 9, lines 16-25 of Tai), which produces a gradual transition between the highlights and shadows (column 4, lines 30-40 of Tai).

Shinya and Tai are combinable because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to produce a gradual transition between highlights and shadows and generating multiple halftone dots at a threshold value using a threshold array, as taught by Tai. The suggestion/ motivation for doing so would have been that threshold arrays are commonly used in halftoning to determine where a dot should be printed for a particular input gray level; and producing a gradual transition between different image regions will better reproduce images with different regions (column 2, lines 46-51 of Tai) and reduce the overall level of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Shinya to obtain the invention as specified in claim 75.

12. Claims 10, 63 and 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Tai (US Patent 5,729,632) and Curry (US Patent 5,696,604).

Regarding claim 10: Shinya in view of Tai does not disclose expressly differing shapes of said first and second dots.

Curry discloses differing dot shapes (column 5, lines 12-17 of Curry).

Shinya in view of Tai is combinable with Curry because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes, as taught by Curry, for the first and second dots taught by Shinya. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya in view of Tai to obtain the invention as specified in claim 10.

Regarding claims 63 and 70: Shinya does not disclose expressly a plurality of dots at a threshold value that include at least one dissimilar characteristic selected from a group consisting of line frequency, shape, tone and orientation.

Tai discloses a plurality of dots at a threshold value (column 8, lines 24-34 and lines 40-46 of Tai) that include at least one dissimilar characteristic including line frequency (column 8, lines 24-34 and column 10, lines 7-9 of Tai) and tone (column 9, lines 36-55 of Tai).

Shinya and Tai are combinable because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a plurality of dots having different frequencies and tones, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Shinya.

Shinya in view of Tai does not disclose expressly that said group consists not only of line frequency and tone, as taught by Tai, but also of shape and orientation.

Curry discloses that said plurality of dots can also be dissimilar in shape (column 5, lines 12-17 of Curry) and orientation (column 5, lines 19-23 and column 6, lines 14-24 of Curry).

Shinya in view of Tai is combinable with Curry because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to specifically have modifiable and thus differing dot shapes and orientations, as taught by Curry, thus making the group of dissimilar characteristics of said

plurality of dots consist of line frequency and tone, as taught by Tai, shape and orientation, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya in view of Tai to obtain the invention as specified in claims 63 and 70.

13. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Tai (US Patent 5,729,632), Curry (US Patent 5,696,604), Broddin (US Patent 5,982,989), and Kemmochi (US Patent 5,627,919).

Regarding claim 11: Shinya in view of Tai does not disclose expressly selecting said shapes of said first and second dots from a group consisting of: elliptical, cross, triangular, circular, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Shinya in view of Tai is combinable with Curry because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya in view of Tai.

Shinya in view of Tai and Curry does not disclose expressly that said group also contains elliptical, cross and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Shinya in view of Tai and Curry is combinable with Broddin because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Shinya in view of Tai and Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone

dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Shinya in view of Tai and Curry.

Shinya in view of Tai, Curry and Broddin does not disclose expressly that said group includes a cross shape.

Kemmochi discloses a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Shinya in view of Tai, Curry and Broddin is combinable with Kemmochi because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the cross shape, taught by Kemmochi, into the group of halftone dot shapes that can be selected from, as taught by Shinya in view of Tai, Curry and Broddin. Said group would then consist of elliptical, cross, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Shinya in view of Tai, Curry and Broddin to obtain the invention as specified in claim 11.

14. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Tai (US Patent 5,729,632) and Delabastita (US Patent 5,828,463).

Regarding claim 13: Shinya in view of Tai does not disclose expressly orienting a first angle of said first dot differently than a second angle of said second dot relative to a first side of said halftone cell.

Delabastita discloses orienting a first angle of a first dot differently than a second angle of a second dot relative to a first side of a halftone cell (figures 1a-1f and column 2, lines 15–20 of Delabastita). The carrier grids have different halftone dot orientations (column 2, lines 15-20 of Delabastita), as clearly do the halftone dots in figures 1c and 1f of Delabastita.

Shinya in view of Tai is combinable with Delabastita because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to orient said first and second dots taught by Shinya at different angles, as taught by Delabastita. The suggestion for doing so would have been that, as is well-known in the art, different color dots are oriented at different angles. Therefore, it would have been

obvious to combine Delabastita with Shinya in view of Tai to obtain the invention as specified in claim 13.

15. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604), Delabastita (US Patent 5,828,463), Broddin (US Patent 5,982,989), and Kemmochi (US Patent 5,627,919).

Regarding claim 16: Shinya does not disclose expressly that said different shape is selected from a group consisting of: elliptical, triangular, circular, cross, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular, rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry and Delabastita does not disclose expressly that said group also contains elliptical, cross and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Shinya in view of Curry and Delabastita is combinable with Broddin because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Shinya in view of Curry. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Shinya in view of Curry and Delabastita.

Shinya in view of Curry, Delabastita and Broddin does not disclose expressly that said group includes a cross shape.

Kemmochi discloses a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Shinya in view of Curry, Delabastita and Broddin is combinable with Kemmochi because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the cross shape, taught by Kemmochi, into the group of halftone dot shapes that can be selected from, as taught by Shinya in view of Curry, Delabastita and Broddin. Said group would then consist of elliptical, triangular, rectangular, circular, cross, diamond and linear shapes. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Shinya in view of Curry, Delabastita and Broddin to obtain invention as specified in claim 16.

16. Claims 17-18, 51 and 56-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604), Delabastita (US Patent 5,828,463), and Tai (US Patent 5,729,632).

Regarding claim 17: Shinya in view of Curry and Delabastita does not disclose expressly that said first and second dots have different tonal characteristics.

Tai discloses differing tonal characteristics of various dots (figure 2 and column 3, lines 37-43 of Tai).

Shinya in view of Curry and Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to differ the tonal characteristics of the dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Shinya in view of Curry and Delabastita to obtain the invention as specified in claim 17.

Regarding claim 18: Shinya in view of Curry and Delabastita does not disclose expressly differing line frequencies of said first and second dots.

Tai discloses differing line frequencies of said first and second dots (column 10, lines 7-11 of Tai). The dots of screen "2" and the dots of screen "3" each have different frequencies (column 8, lines 27-33 of Tai) and are used to form a single array of dots (column 10, lines 7-11 of Tai).

Shinya in view of Curry and Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dots of differing line frequencies, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Shinya in view of Curry and Delabastita to obtain the invention as specified in claim 18.

Regarding claim 51: Shinya in view of Curry and Delabastita does not disclose expressly transitioning between said dots of different frequencies using a dot that includes a third pitch.

Tai discloses transitioning between dots of different frequencies using a dot that includes a third pitch (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai). For a grayscale level of 12 in the example of blending shown in Tai (column 10, lines 2-7 of Tai), a maximum dot size (figure 2(dot size 7) of Tai and a different frequency mid-tone dot size (figure 2 (dot size 5) of Tai) would be used to generate the blending portion of screen "1" (column 3, lines 50-59 of Tai).

Shinya in view of Curry and Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use a dot of a third pitch to transition between said dots of different frequencies, as taught by Tai. The motivation for doing so would have been to further smooth the halftone image output. Therefore, it would have been obvious to combine Tai with Shinya in view of Curry and Delabastita to obtain the invention as specified in claim 51.

Regarding claim 56: Shinya in view of Curry and Delabastita does not disclose expressly that said halftone screen includes a dot having a third line frequency, wherein said dot having said third line frequency is positioned between said dots having different line frequencies.

Tai discloses a dot having a third line frequency, wherein said dot having said third line frequency is positioned between said dots having different line frequencies (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai). For a grayscale level of 12 in the example of blending shown in Tai (column 10, lines 2-7 of Tai), a maximum dot size (figure 2(dot size 7) of Tai and a different frequency mid-tone dot size (figure 2(dot size 5) of Tai) would be used to generate the blending portion of screen "1" (column 3, lines 50-59 of Tai).

Shinya in view of Curry and Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use a dot of a third line frequency to transition between said dots of different frequencies, as taught by Tai. The motivation for doing so would have been to further smooth the halftone image output. Therefore, it would have been obvious to combine Tai with Shinya in view of Curry and Delabastita to obtain the invention as specified in claim 56.

Regarding claim 57: Shinya in view of Curry and Delabastita does not disclose expressly that said halftone screen includes a mid-tone dot positioned between said dots having different line frequencies.

Tai discloses a mid-tone dot positioned between said dots having different line frequencies (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai). For a grayscale level of 12 in the example of blending shown in Tai (column 10, lines 2-7 of Tai), a maximum dot size (figure 2(dot size 7) of Tai and a different frequency mid-tone dot size (figure 2 (dot size 5) of Tai) would be used to generate the blending portion of screen "1" (column 3, lines 50-59 of Tai).

Shinya in view of Curry and Delabastita is combinable with Tai because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use a mid-tone dot positioned between said dots having different line frequencies, as taught by Tai. The motivation for doing so would have been to further smooth the halftone image output. Therefore, it would have been obvious to combine Tai with Shinya in view of Curry and Delabastita to obtain the invention as specified in claim 57.

17. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604), Delabastita (US Patent 5,828,463), and Broddin (US Patent 5,982,989).

Regarding claim 23: Shinya does not disclose expressly that said different shape is selected from a group consisting of: elliptical, triangular, circular, rectangular, diamond and linear shapes.

Curry discloses selecting dot shapes (figure 6 and column 5, lines 41-43 of Curry) from a group comprising circular, rectangular, diamond (column 5, lines 12-16 of Curry) and triangular shapes (column 1, lines 50-51 of Curry).

Shinya and Curry are combinable because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to be able to choose a dot shape from a group comprising circular,

rectangular, diamond and triangular shapes, as taught by Curry. The motivation for doing so would have been to more accurately adjust a halftone printing device, and thus automatically create more accurate halftone patterns (column 1, lines 55–63 of Curry). Therefore, it would have been obvious to combine Curry with Shinya.

Shinya in view of Curry and Delabastita does not disclose expressly that said group also contains elliptical and linear shapes.

Broddin discloses that said group comprises circular, rectangular (square is a type of rectangular), elliptical and linear shapes (column 4, lines 27-35 of Broddin).

Shinya in view of Curry and Delabastita is combinable with Broddin because they are from the same field of endeavor, namely digital image data printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to include the elliptical and linear halftone dot shapes taught by Broddin into the group of halftone dot shapes that can be selected from, as taught by Shinya in view of Curry and Delabastita. Said group would then consist of elliptical, triangular, circular, rectangular, diamond and linear shapes. The suggestion for doing so would have been that the halftone dot shapes taught by Broddin are simply more halftone dot shapes that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Broddin with Shinya in view of Curry and Delabastita to obtain the invention as specified in claim 23.

18. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Pellar (US Patent 4,196,451).

Regarding claim 26: Harrington discloses a halftone cell derived from a threshold equation (figures 3a-3b and column 5, lines 36–43 of Harrington); and a computer-readable medium bearing said halftone screen (column 8, lines 35-38 of Harrington). In order to produce a halftone cell with threshold values, some form of threshold equation is inherent.

Harrington does not disclose expressly that a fold function of said threshold equation generates at least one dot within said halftone cell according to $fold(x) = |||x| - 1/3| - 1/3| * 3$.

Pellar discloses a fold function (column 6, lines 17-25 of Pellar) of a threshold equation that generates at least one dot within a halftone cell (column 6, lines 33-63 of Pellar) according to $fold(x) = |||x| - 1/3| - 1/3| * 3$ (figure 5 and column 6, lines 65-68 of Pellar). The particular fold function is variable, depending upon the desired dot shape characteristics and tone reproduction curve (column 6, lines 65-68 and column 8, line 62 to column 9, line 1 of Pellar). By adjusting the ellipticity (column 8,

line 62 to column 9, line 1 of Pellar) one can obtain a specific fold function to produce a particular halftone cell (figure 5 of Pellar). The specific fold function $fold(x)=\|x|-1/3|-1/3|-1/3|*3$ is merely a particular setting of the apparatus taught by Pellar.

Harrington and Pellar are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a particular setting of the fold function taught by Pellar to obtain a particular overall halftone cell generation and dot growth, similar to the halftone cell shown in figure 5 of Pellar, but particularly using the fold equation $fold(x)=\|x|-1/3|-1/3|-1/3|*3$. The motivation for doing so would have been to obtain particular dot shape characteristics and tone reproduction curve desired by a user for a particular printing project (column 6, lines 65-68 of Pellar). The fold function $fold(x)=\|x|-1/3|-1/3|-1/3|*3$ is merely one of the many possible functions that can be generated. Therefore, it would have been obvious to combine Pellar with Harrington to obtain the invention as specified in claim 26.

19. Claims 45, 48, 61 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Tai (US Patent 5,729,632).

Regarding claim 45: Harrington discloses a printing system (figure 1 of Harrington) comprising a scanning circuit (figure 1(10) of Harrington) for reading image data from a source (column 4, lines 21-24 of Harrington); a processor in communication with said scanning circuit (figure 1(20) of Harrington), wherein said processor receives and processes the image data to generate an image file (column 4, lines 33-38 of Harrington); and an image setter in communication with said processor (figure 1(30) of Harrington), wherein said image setter receives said image file from said processor and produces a plurality of dots on a halftone screen (column 4, lines 40-46 and column 5, lines 35-39 of Harrington). The resultant colorant values must be stored in some form of an image file since the colorant values are then halftoned at the halftoning processor and used to drive the printer (column 4, lines 38-40 of Harrington).

Harrington does not disclose expressly that said plurality of dots includes a plurality of line frequencies at a threshold value.

Tai discloses printing a plurality of dots including a plurality of line frequencies at a threshold value (column 8, lines 24-34 and lines 40-46 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of

ordinary skill in the art to use a plurality of line frequencies for said plurality of dots, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington to obtain the invention as specified in claim 45.

Regarding claim 48: Harrington discloses a program product comprising a computer-executable program (column 8, lines 35-38 of Harrington) configured to produce a plurality of dots on a recordable medium (column 4, lines 40-46 of Harrington); and a computer-readable medium bearing said program (column 8, lines 35-38 of Harrington).

Harrington does not disclose expressly that said plurality of dots includes multiple line frequencies at a threshold value.

Tai discloses a plurality of dots including a multiple line frequencies (column 8, lines 24-31 of Tai) at a threshold value (column 7, lines 29-35 of Tai).

Harrington and Tai are combinable because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use multiple line frequencies for said plurality of dots, which are generated at a threshold value, as taught by Tai. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Harrington to obtain the invention as specified in claim 48.

Further regarding claim 61: Tai discloses that said program is further configured to gradually transition (figure 8 and column 9, lines 63-65 of Tai) between said multiple line frequencies (column 8, lines 24-31 and column 10, lines 7-9 of Tai).

Further regarding claim 71: Tai discloses creating a smooth transition between said plurality of dots (figure 2; column 3, lines 50-59; and column 10, lines 2-7 of Tai).

20. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wang (US Patent 5,748,330) in view of Tai (US Patent 5,729,632).

Regarding claim 47: Wang discloses a scanning circuit for reading image data from a source (column 6, lines 8-20 of Wang); a processor in communication with said scanning circuit, wherein said processor receives and processes the image data to generate an image file (column 6, lines 6-20 of Wang); and an image setter in communication with said processor, wherein said image setter receives said image

file from said processor and produces a plurality of dots on a halftone screen (figure 3A and column 6, lines 6-20 of Wang), said plurality of dots including a first and second dot within a halftone cell of said halftone screen, wherein said image setter determines that at least a portion of said first dot overlaps at least a portion of said second dot (figures 3A-3D and column 6, lines 6-9 and lines 21-24 of Wang).

Wang does not disclose expressly that said first and second dots are dissimilar and generated at a threshold value.

Tai discloses using dissimilar halftone dot shapes (figure 2 and column 3, lines 37-43 of Tai) and generating said halftone dots at a threshold value (column 7, lines 29-35 of Tai).

Wang and Tai are combinable because they are from the same field of endeavor, namely digital halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use dissimilar dot shapes, as taught by Tai, which would include said first and second halftone dot shapes taught by Wang. The motivation for doing so would have been that using different types of grayscale dot representations for specific regions (column 2, lines 46-51 of Tai) reduces the amount of image artifacts (column 2, lines 36-42 of Tai). Therefore, it would have been obvious to combine Tai with Wang to obtain the invention as specified in claim 47.

21. Claims 53 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604), Delabastita (US Patent 5,828,463), and Kemmochi (US Patent 5,627,919).

Regarding claims 53 and 59: Shinya in view of Curry and Delabastita does not disclose expressly generating a cross shape.

Kemmochi discloses generating a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Shinya in view of Curry and Delabastita is combinable with Kemmochi because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to generate the cross dot shape taught by Kemmochi in the printing plate halftone screen taught by Shinya in view of Curry and Delabastita. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Shinya in view of Curry and Delabastita to obtain the invention as specified in claims 53 and 59.

22. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinya (US Patent 4,677,493) in view of Curry (US Patent 5,696,604) and Kemmochi (US Patent 5,627,919).

Regarding claim 66: Shinya in view of Curry does not disclose expressly that said overlapping further includes generating a cross shape.

Kemmochi discloses a cross dot shape (figure 1A; figure 5; column 4, lines 9-15 and column 6, lines 15-26 of Kemmochi).

Shinya in view of Curry is combinable with Kemmochi because they are from the same field of endeavor, namely digital image printing and processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to generate a cross shape, taught by Kemmochi. The suggestion for doing so would have been that the cross halftone dot shape taught by Kemmochi is simply one more halftone dot shape that are possible for one of ordinary skill in the art to use when designing a halftone screen. Therefore, it would have been obvious to combine Kemmochi with Shinya in view of Curry to obtain the invention as specified in claim 66.

23. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrington (US Patent 5,631,748) in view of Tai (US Patent 5,729,632) and Delabastita (US Patent 5,828,463).

Regarding claim 72: Harrington discloses that said recording medium is one medium selected from a group consisting of a threshold array (figure 3b and column 5, lines 36-39 of Harrington) and a halftone screen (column 5, lines 36-39 and column 3, lines 5-8 of Harrington).

Harrington in view of Tai does not disclose expressly that said group consists not only of a threshold array and a halftone screen, as taught by Harrington, but also of a printing plate.

Delabastita discloses a printing plate as a recording medium (column 6, lines 49-57 of Delabastita).

Harrington in view of Tai is combinable with Delabastita because they are from the same field of endeavor, namely halftone image processing. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a printing plate, as taught by Delabastita. Said group would then consist of a threshold array and a halftone screen, as taught by Harrington, and a printing plate, as taught by Delabastita. The suggestion for doing so would have been that a printing plate is one of the many old and well-known possible means available to one of ordinary skill in the art on which to form a halftone screen. Therefore, it would have been obvious to combine Delabastita with Harrington in view of Tai to obtain the invention as specified in claim 72.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Thompson whose telephone number is 571-272-7441. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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